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ABSTRACT

This paper is a report of a study designed to develop recommendations on minimum qualifying scores for National Teacher Examinations (NTE) that are valid for certification and endorsement in Tennessee. The functions performed in the review of the NTE Core Battery and Specialty Area tests were conceptualized as panel activities. The number of panels required for the study was determined by the number of tests and the functions to be performed. The size of each panel was based on the scope of the test content and panel's functions. Separate panels were utilized to perform the knowledge estimation function for each objective test or test section. A separate panel was employed to conduct these functions for the Essay section of the Test of Communication Skills. The Standards Committee was responsible for developing recommendations on minimum qualifying scores for the valid NTE tests. The Standards Committee recommended a four-step progression of minimum qualifying scores on the NTE Core Battery and Specialty Area tests over a five year period. In the fifth year, the required scores would be three standard errors of measurement below the estimated scaled scores for minimally qualified certification and endorsement applicants. (DWH)

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VALIDATION OF THE NATIONAL TEACHER EXAMINATIONS CORE BATTERY AND SPECIALTY AREA TESTS: STANDARD SETTING RESULTS

Symposium Paper

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Introduction

One of the objectives of this study was to develop data-based recommendations on minimum qualifying scores for NTE tests that are valid for certification and endorsement in Tennessee.

In order to obtain the data required for the study, three purposes were specified, one of which was to estimate the performance levels on the tests for certification and endorsement applicants who are minimally qualified.

The objectives of the study required the achievement of an additional purpose, which was to develop recommendations on minimum qualifying scores for the NTE tests that are valid to use in Tennessee. This facet of the study was conducted by a committee of representatives from professional education preparation institutions, local school districts, and the public.

Rationale for the Methodology

The literature on standard-setting for certification examinations does not demonstrate a singular appropriate or clearly superior methodology. The use of professional judgment under relatively controlled conditions as employed in this study complies with accepted measurement principles and has been widely utilized in similar studies. The procedures used in making judgments deal with standard setting (judgments about levels of test performance necessary for persons who are minimally qualified in specialized areas). Consequently, the methods used in the study required the estimation of the minimum qualifying score for certification and endorsement. The legal rationale for the methodology of this study is described by Roth (1984).

The estimation of performance levels expected of minimally qualified applicants for certification and endorsement necessitated a broad-based familiarity with the responsibilities of professional public education personnel in Tennessee. These requirements were addressed by systematically

collecting and analyzing the judgments of representative groups of professional educators with appropriate experiences in local school districts and higher education institutions.

The study participants were assigned a specific function to be performed: knowledge estimation. Both higher education and local school district personnel participated in the knowledge estimation activities. An independent committee utilized the results from the knowledge estimation to make recommendations on minimum qualifying scores.

Human judgment by professional educators was unquestionably the foundation of the study. While judgments by professionals are an integral part of all research, such judgments were used to generate the raw data that were analyzed statistically in this study. This strategy for data collection was necessary to provide information needed to determine the minimum qualifying scores of the NTE Core Battery and Specialty Area tests in the initial certification and endorsement process. The alternative strategies available and described in the literature were inadequate because they do not encompass all functions required for standard setting.

In establishing minimum score requirements, the Standards for Educational and Psychological Tests state that "If specific cutting scores are to be used as a basis for decisions, a test user should have a rationale, justification, or explanation of the cutting scores adopted" (APA, p. 66). The rationale for the recommendations on minimum qualifying scores derived in this study is that the scores must be based on the collective judgments of representative experts. The personnel who performed the knowledge estimation function were qualified experts from local school districts and professional preparatory higher education institutions throughout Tennessee. Their combined judgments constituted the basis for determining the minimum scores on knowledge and academic skills

required for initial certification and endorsement of professional public education personnel in Tennessee.

Panel Functions

The functions performed in the review of the NTE Core Battery and Specialty Area tests were conceptualized as panel activities. A separate panel was utilized to perform the knowledge estimation function for each objective test or test section. A separate panel was employed to conduct these functions for the Essay section of the Test of Communication Skills.

Knowledge Estimation Panels

The members of the Knowledge Estimation Panel for each test performed a single task in making judgments about performance levels of minimally qualified personnel who are beginning professional public educators in Tennessee. The steps involved in preparing for the task and making the judgments are described below.

The panelist was required to conceptualize a hypothetical reference group of only those college graduates who are likely to pursue professional education careers in the elementary or secondary grades, excluding persons who are likely to pursue graduate study or non-teaching careers. In regard to the NTE Core Battery Tests, the reference group should include graduates with majors in all fields at professional preparation institutions in Tennessee. Next, the panel member was instructed to consider only those graduates who are minimally qualified as beginning professional educators in Tennessee (i.e., those who have the minimum knowledge and academic skills for competent performance). Since teachers are thoroughly experienced in using this concept, they are likely to perform conscientiously and well in defining minimal competence because of the consequences of making incorrect judgments with regard to

individuals.

The panel member was directed to make estimates about knowledge as opposed to correct responses that would include guessing correctly. In advance of the panel meeting, the panelist was encouraged to obtain information locally about the relevant curriculum and professional preparation program. An exercise was used at the meeting sites to assist the panelist in forming the appropriate reference group and making judgments about knowledge levels.

Judgments were made on each test question by the panel member using a 7-point numerical response scale (2%, 10%, 25%, 40%, 60%, 80%, and 98%). The score points were not described verbally for two reasons: (1) to avoid influencing the judgments made and (2) to utilize the familiar and widely used numerical basis for judging test performance. More score points were specified on the lower portion of the response scale to facilitate more accurate judgments of knowledge levels for the more difficult questions.

Essay Panel

The members of the Essay Panel met as a group to perform the functions required for the Essay section of the Test of Communication Skills. The unique nature of the Essay section in contrast to the multiple-choice form of the other portions of this NTE test necessitated alternative procedures. The panel members performed all functions pertaining to the Essay.

First, the panelist reviewed two essay topics that have been used in national administrations of the NTE Test of Communication Skills. The panel member answered three questions on each essay: (1) Is the topic content-free (i.e., Does one need specific content knowledge such as educational theory or history to write on the topic)? (2) Is the topic relevant to the college curriculum (i.e., Would students who complete professional education preparation programs have the opportunity to acquire the skills needed to write on

the topic)? (3) Is the topic job-relevant (i.e., Are the writing skills assessed necessary for a beginning professional public educator in Tennessee)?

Second, the panelist reviewed a set of range finder essays that demonstrated the levels of writing produced by examinees who responded to one of the topics on a national administration of the test. Each range finder essay represented one of the six points on the rating scale (1-6) as judged by trained essay readers. The panelist read the letter-designated essays and assigned rank orders from most ably written to least ably written. Then, the panel members discussed the establishment of a minimum acceptable score for these essays as well as the distinguishing characteristics of passing essays (minimally acceptable writing) and failing essays (unacceptable writing).

Third, the panel member received a packet of 70 essays that were written by 70 examinees in a national administration of the NTE Test of Communication Skills. These essays represented a range of 2-12 on the essay scoring scale. (A score for the essay is derived by summing the ratings of 1-6 assigned by two trained readers. A rating of 0 may be assigned if the essay is not on the topic of the question.) Five essays represented each of the scoring scale values of 2, 3, 7, 8, 9, 10, 11, or 12 while ten essays represented each of the values of 4, 5, or 6. More essays with scores in the range of 4-6 were included because experience has shown that the minimum acceptable score usually falls within this range. Having been assigned alphabetic designations from A to RRRR, the essays were read in alphabetic order. The essays were randomly sequenced on the scoring scale before assigning alphabetic designations. The panel member read and classified each essay as qualified/pass or unqualified/fail.

Fourth, the types of classification errors that could result from setting improper minimum acceptable scores were explained to the panelists. Setting

the score too high would cause some or all essays that were judged acceptable to fall below the pass score (a false negative error). Setting the score too low would cause some or all essays that were judged unacceptable to fall above the pass score (a false positive error). After the discussion, each panelist read again two essays at each of the scoring scale values of 4, 5, and 6 and discussed the writing in these essays. Finally, each panel member recorded on paper the recommended minimum acceptable score for the Essay section of the NTE Test of Communication Skills.

Standards Committee Functions

The Standards Committee was responsible for developing recommendations on minimum qualifying scores for the valid NTE tests.

Minimum Qualifying Scores

The first step in developing recommendations on minimum qualifying scores was the presentation to the Standards Committee of the data that were derived from the Knowledge Estimation Panel for each test. These data consisted of estimated scores of persons who, based on the judgments of the panelists, are minimally qualified for initial certification and endorsement as beginning professional public educators in Tennessee. In addition, the standard error of measurement, a quantitative measure of imprecision, was presented for each test.

The committee was provided two sets of NTE score distributions for examinees who had taken the NTE Core Battery and Specialty Area tests. The first set contained the scores of all examinees from Tennessee who took the NTE Core Battery tests in March, 1984. The second set consisted of the scores of all exmainees from the Southeast (Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virgina) who took the

NTE Specialty Area tests between July, 1980, and November, 1983. Both sets of score distributions contained results for examinees classified by ethnic group.

In formulating its recommendations, the Standards Committee considered initially the establishment of the minimum qualifying score three standard errors of measurement below the estimated mean for each test. (This performance level is justifiable statistically to account for the imprecision of the tests.) A review of the probable impact of recommending minimum qualifying scores at this level led to the exploration of alternatives. The strategy adopted was to recommend a four-step progression of increased minimum qualifying scores on the NTE Core Battery and Specialty Area tests over a five-year period that would reach three standard errors of measurement below the estimated mean for each test at the fourth step. The scores at the first step for most NTE Specialty Area tests would be adjusted downward because of the anticipated adverse impact on legally protected ethnic minority group members.

Organization of Panels

The number of panels required for the study was determined by the number of tests and the functions to be performed. The size of each panel was based on the scope of the test content and the panel's functions. The number and size of panels are discussed next. In this study, a panel was defined as a group of experts assigned to perform a specific function or set of functions for one of the NTE tests or test sections. Since the panel members made individual judgments on the objective tests, the entire panel was not required to meet as a group except for the panel that reviewed the Essay section of the NTE Core Battery Test of Communication Skills. Twenty-eight Knowledge Estimation Panels were formed for the NTE Core Battery and Specialty Area

tests.

Some special considerations were made in specifying the number of panels required to conduct the Knowledge Estimation for the Test of General Knowledge and the Test of Communication Skills. While these tests cover multiple disciplines, the content of each test is delimited to elementary levels by the test specifications. Efforts were made to ensure that each panel had representation by experts from the diverse content areas.

The strategy used in the study did not require that each panel member have teaching experience in every subject area covered by an NTE test. For example, a panel member assigned to social studies might have taught courses in one or a few of the disciplines (such as economics, geography, government, history, or sociology). This limitation was addressed through (1) requesting that panelists prepare for the data collection in advance by becoming knowledgeable about institutional course content and (2) providing the "Do Not Know" response option on the data collection forms for the knowledge estimation function.

Sizes of Panels

The sizes of the panels for the NTE Core Battery and Specialty Area tests were established on the basis of several factors. These factors included the need to include adequate representation of the diversity among local school districts and higher education institutions offering professional preparation programs, the need for congruence between the combined professional backgrounds of the panel members and the scope of the test content, the need to obtain sufficiently reliable judgments about the test questions, and the availablity of qualified professionals in specific areas.

Based on consideration of these factors, target numbers were established for the panels: forty members would serve on the Knowledge Estimation Panel for each test. The panel for the Essay section of the Test of Communication -

Skills was specified to be 15 members. For each NTE Specialty Area test, the size of the panel was 20 for the Knowledge Estimation Panel. The Knowledge Estimation Panels were composed of the individuals who served on the other types of panels.

Essay Panel Results

The Essay Panel was assigned to perform the knowledge estimation function for the Essay section of the NTE Core Battery Test of Communication Skills. The knowledge estimation function was performed by obtaining individual recommendations on minimally acceptable scores for initial certification and endorsement applicants in Tennessee.

The members of the Essay Panel made independent judgments on the recommended minimally acceptable score for the Essay section of the NTE Core Battery Test of Communication Skills based on the possible score range of 0-12, the combined score scale used to sum the ratings scores given by two readers. Six panel members recommended a minimum scaled score of 6, eight recommended 5, and one recommended 4. The mean of the recommended scaled scores was 5.33, the value used in deriving the composite score for the Communication Skills Test. This value is consistent with the judgments made by the panelists in rating the 70 essays from the national administration of the test. As reported in Table 1, the fewest classification errors were made for essays with scaled scores of 5 and 6 (202 for a score of 5 and 194 for a score of 6).

Knowledge Estimation Panel Results

The members of the Knowledge Estimation Panel for each test or test section on the NTE Core Battery and Specialty Area tests made judgments independently on the percentage of minimally qualified applicants for certification and endorsement in Tennessee who would know the answer to each question. Based on

Table 1

Classification Errors at Selected Pass Score Values
Based on Essay Panel Judgments
(N=15*)

Number of Essays Judged	Pass Score	Judged Pass for Papers that Fail	Judge Fail for Papers that Pass	Total Classification Errors
5	12	617	0	617
5	11	543	1	544
5	10	470	3	473
5	9	397	5	402
5	8	338	21	359
5	7	267	25	292
10	6	143	51	194
10	5	72	130	202
10	4	21	229	250
5	3	3	286	289
5	2	0	358	358

*The Essay Panel read 70 essays from a national test administration that had been scored by expert readers on a scale of 2-12 points (the "pass score" above). Each panelist read and judged each essay independently on a pass/fail basis. The base number in determining the number of classification errors was 1,050 (70 essays times 15 panel members). If the pass score were set at a scale value of 12, a total of 617 judgments would be made that essays with scores below 12 would pass; and no judgments would be made that an essay with a scaled score of 12 would fail. Therefore, 617 classification errors would be made and the remaining 433 essays would be correctly classified.

the response choices (2%, 10%, 25%, 40%, 60%, 80%, and 98%) selected, the mean percentage for each question was computed and adjusted upward to account for guessing the correct answer if unknown to the examinee. The sum of the adjusted percentages represented the raw score mean for the test or test section. The raw score mean was converted to a scaled score mean using conversion parameters provided by ETS.

Table 2 presents the results of the knowledge estimation function for the NTE tests. Since the NTE Core Battery Test of Communication Skills and General Knowledge have four sections in each test, the raw score for each section must be multipled by the appropriate weight in order to obtain the sum of the products that constitutes the weighted raw score mean for the test. The conversion of the raw score means reported in the table to scaled score means on a scale of 600 to 690 produced the following values: 662 for the Test of Communication Skills, 658 for the Test of General Knowledge, and 655 of the Test of Professional Knowledge. Although these scores are on the same scale, they are not directly comparable because the tests are normed independently on different groups of examinees and their standard errors of measurement differ.

For each of the 25 NTE Specialty Area tests, the adjusted raw score mean presented in the table was converted to a scaled score mean. The scaled score means ranged from 622 to 731 on a scale with a minimum value of 250 to a maximum of 990. The scaled score means for six tests exceeded 700 and seven were below 650. These scores cannot be compared directly for the reasons cited earlier: different normative groups and very dissimilar standard errors of measurement.

Standards Committee Actions

The Standards Committee elected one of its members to serve as chair during the deliberations in order to take the formal actions required. The

Table 2
Results of Analyses on Estimated Scores for Minimally Qualified Certification Candidates by NTE Test

Test Number and Name	No. of Questions Reviewed	Raw Score Mean	Weight	Scaled Score Mean	Standard Error of Measurement	N
Core Battery						
Communication Skills:						
61 Listening	40	31.655	2.3624	-------	----	33
62 Reading	30	21.103	2.6313	-------	----	34
63 Writing--Essay*	1	5.333	3.8581	-------	----	15
64 Writing--Multiple Choice	45	32.004	1.0000	-------	----	34
Composite**	116	182.889	------	662.109	3.3	--
General Knowledge:						
65 Literature and Fine Arts	35	21.493	1.0000	-------	----	23
66 Mathematics	25	16.549	1.2243	-------	----	24
67 Science	30	19.312	1.1666	-------	----	23
68 Social Studies	30	20.100	1.1688	-------	----	25
Composite**	120	87.776	------	658.090	3.5	--
69 Professional Knowledge	104	63.779	------	655.194	4.0	38
Specialty Area						
1 Education in the Elementary School	147	90.191	------	657.535	24	18
2 Early Childhood Education	149	94.794	------	692.145	27	20
3 Biology and General Science	160	97.483	------	650.254	18	16
4 English Language and Literature	150	93.554	------	628.931	21	18
5 Industrial Arts Education	148	93.319	------	704.343	19	16
6 Mathematics	120	77.009	------	705.715	23	20
7 Chemistry, Physics, and General Science	150	97.536	------	685.529	21	18
8 Social Studies	149	87.845	------	653.460	22	17
9 Physical Education	150	97.002	------	730.550	25	23
10 Business Education	157	93.599	------	694.625	23	19
11 Music Education	150	88.500	------	656.778	28	20
12 Home Economics Education	150	96.650	------	627.125	23	16
13 Art Education	150	93.348	------	639.005	26	20
17 French	179	107.962	------	675.433	21	18
18 German	160	94.439	------	622.256	25	15
19 Spanish	157	97.050	------	643.024	22	18
20 Introduction to the Teaching of Reading	150	90.788	------	639.790	26	19
22 Speech Communication	150	99.731	------	709.674	30***	15
30 Reading Specialist	150	99.658	------	651.155	26	19

*Score range is 0 to 12.
**Composite raw score mean is weighted raw score mean.
***Estimated by ETS.

Table 2 (Continued)
Results of Analyses on Estimated Scores for Minimally Qualified Certification Candidates by NTE Test

Test Number and Name	No. of Questions Reviewed	Raw Score Mean	Weight	Scaled Score Mean	Standard Error of Measurement	N
31 Media Specialist--Library and Audiovisual Services	138	80.461	------	645.295	25	21
32 Education of the Mentally Retarded	150	96.322	------	675.639	26	19
33 Speech-Language Pathology	130	78.353	------	674.974	27	20
34 Audiology	130	92.253	------	698.220	22	18
41 Educational Administration and Supervision	150	86.317	------	700.893	30	19
42 Guidance Counselor	155	102.712	------	708.010	26	18

*Score range is 0 to 12.
**Composite raw score mean is weighted raw score mean.
***Estimated by ETS.

recommendations on minimum qualifying scores and other matters are reported below.

Minimum Qualifying Scores

After making decisions on test validity, the Standards Committee received from the study staff the results of the knowledge estimation function performed by the panels assigned to the tests and test sections of the NTE Core Battery and Specialty Area tests. These data were needed to address the following question: for each valid NTE test, what is the minimum qualifying score that should be required for initial certification and endorsement of beginning professional public education personnel in Tennessee?

The data presented and described by the study staff included the estimated raw score means and the scaled score means for the NTE tests based on the responses of the panel members. These data were described as the estimated scores of minimally qualified applicants for intial certification and endorsement of beginning professional educators in Tennessee. The staff also

derived scaled scores for each test that represented one, two, and three standard errors of measurement below the scaled score equivalent of the estimated raw score mean.

The consideration of establishing minimum qualifying scores as low as three standard errors of measurement below the estimated scaled score of a minimally qualified applicant is based on recognition of the imprecision of thetests. The score derived from the responses of panel members is a theoretical true score that would be obtained by a minimally qualified applicant. The examinee who takes a test would obtain a score that falls within a range of scores above and below the examinee's true score. If the minimum qualifying score is established at three standard errors of measurement below the theoretical or estimated score for a test, the probability is 99% that a minimally qualified applicant will achieve an acceptable score.

The committee assessed the impact of using minimum qualifying scores three standard errors of measurement below the estimated scaled score for each NTE test. The assessment was made by reviewing the failure rates on two sets of score distributions: (1) the scores of all examinees from Tennessee classified by ethnic group who took the NTE Core Battery tests at the March, 1984, administration and (2) the scores of all examinees from nine states in the Southeast classified by ethnic group who took the NTE Specialty Area tests between July, 1980, and November, 1983. This review revealed that the failure rates based on minimum qualifying scores three standard errors of measurement below the estimated scaled scores were unacceptably high in the judgment of the committee.

After considering various alternatives and their potential impact in terms of the success/failure rates of examinees, the Standards Committee recommended a four-step progression of minimum qualifying scores on the NTE Core Battery

and Specialty Area tests over a five-year period from 1984-85 to 1988-89. The recommended minimum qualifying score for each test is reported in Table 3. In the fifth year (1988-89), the required scores would be three standard errors of measurement below the estimated scaled scores for minimally qualiifed certification and endorsement applicants. In 1987-88, the minimum qualifying scores would be four standard errors of measurement below the estimated scaled

Table 3
Recommended Minimum Qualifying Scores on Valid NTE Core Battery and Specialty Area Tests by Time Period

Test	Minimum Qualifying Score by Time Period			
	1984-86	1986-87	1987-88	After 1987-88
Core Battery				
Communication Skills	640	644	647	651
General Knowledge	637	640	644	647
Professional Knowledge	631	635	639	643
Specialty Area* (Test Number and Name)				
1 Education in the Elementary School	490	540	560	590
2 Early Childhood Education	490	560	580	610
3 Biology and General Science	520	560	580	600
4 English Language and Literature	480	520	540	570
5 Industrial Arts Education	550	610	630	650
6 Mathematics	520	590	610	640
7 Chemistry, Physics, and General Science	500	580	600	620
8 Social Studies	490	540	570	590
9 Physical Education	540	610	630	660
10 Business Education	530	580	600	630
11 Music Education	480	520	540	570
12 Home Economics Education	490	510	540	560
17 French	490	570	590	610
18 German	470	500	520	550
19 Spanish	480	530	560	580
20 Introduction to the Teaching of Reading	470	510	540	560
22 Speech Communication	480	560	590	620
30 Reading Specialist	480	520	550	570
31 Media Specialist--Library and Audiovisual Services	500	520	550	570
33 Speech-Language Pathology	510	540	570	590
34 Audiology	570	590	610	630
41 Educational Administration and Supervision	530	550	580	610
42 Guidance Counselor	540	580	600	630

*Scaled scores for the NTE Specialty Area Tests are reported as multiples of 10.

score. The minimum qualifying scores in 1986-87 would be five standard errors of measurement below the estimated scaled score.

The recommendations on the establishment of initial minimum qualifying scores for the NTE Core Battery and Specialty Area tests would apply for a two-year period during 1984-86. During this two-year period, the minimum qualifying scores for the Core Battery tests and three of the Specialty Area tests would be six standard errors of measurement below the estimated scaled scores for minimally qualified applicants. The minimum qualifying scores for 20 of the 23 valid Specialty Area tests were adjusted to lower levels based on a review of the score distributions for Specialty Area examinees in the Southeast classified by ethnic group. In the judgment of the committee, lower initial minimum qualifying scores for these 20 tests are necessary because of the anticipated adverse impact on legally protected ethnic minority group members based on previous test performance results.

Additional Committee Recommendation

In the course of committee deliberations, an additional recommendation was formally adopted that would be sent to the State Department of Education was that it conduct a thorough review of the results of using the NTE at the end of the first, third, and fifth years during the 1984-89 time period.